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NEW REPRODUCTIVE TECHNOLOGIES:

ISSUES AND QUESTIONS

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The Manitoba Advisory Council on the Status of Women is an "arms-length" government organization responsible for advising the Manitoba Government on matters of concern to women. The objective of the Advisory Council is to advance the goal of equal participation of women in society and to promote changes in social, legal and economic structures to that end.

INTRODUCTION

The term "reproductive technologies" covers a very broad range of practices related to pregnancy and childbirth. Contraception, abortion, prenatal testing, dealing with infertility, genetic screening, alternate means of fertilization, storage of human eggs, sperm and embryos; all of these are included in reference to reproductive technologies.

Some reproductive technologies have been around for a very long time. Genoveffa Corea, in her landmark book The Mother Machine (1985), tells us that in vitro fertilization was first experimented with (unsuccessfully) in 1878, using a rabbit egg. Embryo transfer between animals began in 1890 and embryos were first cultured from mammalian germ cells in 1920. Sperm was first frozen around 1770 by Lazzarro Spallanzani. Artificial insemination has been performed in the western cultures for at least two hundred years and is mentioned in the Jewish Talmud and in early Egyptian writings.

The term "reproductive technologies", however, is more often used these days to describe much newer developments, some of them old practices with a new technological twist. An example of this is so-called surrogate mother arrangements, where a woman may carry and give birth to a baby that is genetically unrelated to her.

This paper refers in particular to the "new reproductive technologies", by which we mean very recent developments that are already having far-reaching effects on individuals, especially women and children, family structures, public policy, and the medical, legal, and scientific professions. New reproductive technologies are available today in all Canadian provinces. It is important to recognize that when we talk about many of these technologies, we are not referring to practices of the future, but to practices that are currently a part of our lives and are becoming more and more commonly used.

Although this paper discusses new reproductive technologies from a critical perspective, it is important to state at the outset that for many infertile women and couples, these new technologies represent what can be described as no less than a miracle. We acknowledge that there is a significant and legitimate demand for these technologies. We must be vigilant, however, in ensuring that their impact on women, and on society as a whole, is beneficial.

This paper is intended to be used primarily as a basic information guide and discussion tool. It contains brief descriptions of the more commonly known new reproductive technologies. In each case, some of the major issues which arise because of a particular development or practice are reviewed, and questions for discussion are posed.

Many of the issues discussed in this paper are common to all or most of the reproductive technologies, although they may not be mentioned in each section. General issues such as informed consent, reproductive autonomy, ethics, commercialization of human reproduction, safety, and long-term effects, are involved in all of these discussions.

It must be emphasized that none of the sections below attempts to describe completely all of the relevant issues or all of the related procedures. Reproductive technologies often involve concepts and practices which are not only extremely complex, but are changing rapidly.

IN VITRO FERTILIZATION

In vitro fertilization (IVF) has been one of the more well-publicized new reproductive technologies, especially since the practice gained great publicity with the 1978 birth in England of Louise Brown. Louise was the first baby to be conceived in this manner.

Sometimes known as the production of "test tube babies", IVF is in fact done in a glass petri dish in a laboratory. First of all, a woman's ovaries are artificially stimulated to produce several eggs instead of the single egg that most women produce each month through ovulation. "Superovulation" is brought about by the use of one

or several drugs and hormones. Daily blood tests and frequent ultrasound procedures are done to track the ovulation process.

Several eggs are then removed from a woman's body either by means of a laparoscopy, which is a surgical procedure performed under general anaesthesia, or by ultrasound-guided needle aspiration, which theoretically requires only a local anaesthetic, but in actual practice is usually also done under general anaesthesia.

Soon after the eggs are obtained, they are fertilized in the petri dish with sperm, either from the woman's spouse or an anonymous donor. The fertilized egg is then transferred to the woman's uterus, or, much more rarely, to the uterus of another woman who has agreed to act as a surrogate. If all goes well, a normal pregnancy results.

In most circumstances, several eggs are fertilized, resulting in several embryos. More than one embryo is then transferred into the woman's uterus, to increase the chances of implantation. As many as ten embryos have been placed in a woman's uterus, although the average is about three or four. In the very few cases where a normal pregnancy results, this practice contributes to the higher rate of multiple pregnancies from IVF.

Some IVF practitioners deal with the problem of multiple embryos by freezing some of them, to be used in subsequent IVF attempts with the same couple. A number of babies have been born using IVF with frozen embryos.

Issues:

IVF continues to be a controversial procedure in spite of its popular image and the number of IVF clinics that have sprung up in Canada and around the world. What is often seen in the media is the infrequent IVF case which has resulted in a birth and not the story of the majority of couples who are unsuccessful.

The physical risks of IVF to the woman are still being defined. There are not only the usual risks of undergoing general anaesthesia, but also the uncertain effects of the drugs used to stimulate the woman's ovaries.

One of these drugs, Clomid, has been identified as having a chemical structure similar to diethylstilbesterol, or DES.[1] DES was given to thousands of pregnant women for more than two decades, in spite of dubious proof that it prevented miscarriage. A generation later, the sons and daughters of women who took DES, as well as the women themselves, are experiencing extremely high rates of certain kinds of cancer.

Other risks associated with IVF, and this is not a complete list, include: unknown long-term effects of hormone use, trauma to the ovaries and uterus, increased rate of spontaneous abortions, high risk of multiple pregnancies and births, ectopic pregnancies, which occur in 5 to 10% of IVF pregnancies, as compared to .5 to 1% of normally conceived pregnancies, and increased chance of caesarian delivery.[2]

IVF also has an extremely low success rate, which many women's health advocates say should define IVF as a process that is still highly experimental. The most optimistic figures used by IVF clinics range from 10 to 15%. Most clinics quoting these figures are also counting ectopic pregnancies or "chemical" pregnancies which are very short-lived, or even fertilization attempts. The actual number of babies born through IVF would result in much lower figures. Furthermore, these numbers are not based on percentages of all women who are initially accepted into IVF clinics. Many women are screened out at some point in the process because a procedure has not been successful.

IVF is by any measure an extremely expensive procedure, involving use of operating room time, laboratory procedures, ultrasound facilities, drug costs, and, if a pregnancy results, prenatal and birth care associated with "high-risk" pregnancies. The complex timing of the pre-IVF procedures, such as daily blood tests and injections, ultrasound scans and laparoscopy, have also meant that many women undergoing IVF have had to leave their paid work or take extended leaves of absence.

There is limited public medical insurance available to cover the costs of IVF in some provinces, and even those plans do not cover all the costs. Most provincial health plans do not cover IVF at all, meaning that very few infertile couples can afford the thousands of dollars that even one or two IVF attempts can cost.

Financial and other restrictions on who may benefit from IVF procedures have resulted in concerns that the effect may be one of "selective breeding" practices,

or eugenics, which say that only certain people should be having children.

At the same time, the psychological costs of IVF cannot be overlooked. Women undergoing IVF procedures report considerable tension, frustration, depression, and feelings of failure and inadequacy, when they fail to conceive through this method. Many women undergo this procedure repeatedly, with no success.

It must also be kept in mind that although IVF was developed to circumvent fertility problems such as blocked fallopian tubes, it is sometimes performed on perfectly healthy, fertile women. In these cases it is the male partner who is infertile and the procedure is done so that a resulting child would be genetically related to both parents. Undergoing IVF in these circumstances has been known to result in the destruction of previously normal fallopian tubes because of an ectopic pregnancy.

Questions for Discussion:

What pressures to reproduce do infertile couples feel that encourage them to seek procedures such as IVF? Why, for many couples, is such a high value placed on children who are genetically related to their parents?

Do the high costs, risks, and low success rates of IVF justify pursuing this practice, as opposed to putting resources into the prevention of infertility in the general population?

Who should have access to IVF? Should such procedures be available to all infertile individuals, regardless of marital status, economic status, or other characteristics? Should IVF be paid for out of public health funds?

In cases where embryos are frozen but not used, how should they be disposed of?

ARTIFICIAL INSEMINATION

As stated earlier, artificial insemination (AI) is actually quite an "old" reproductive technology. However, it is usually included in any discussion of new reproductive technologies because of its role in related developments such as

"surrogate" motherhood and because of the social controversy surrounding some current uses of this relatively simple, "low-tech" procedure.

AI at its simplest involves placing sperm in the vaginal canal to achieve fertilization by means other than sexual intercourse. This is the only "artificial" aspect of this reproductive technology; all other aspects of conception, pregnancy, and birth take place as usual. The procedure is likely more often performed in a medical setting such as a fertility clinic in a hospital, but is also used successfully and safely in non-medical settings.

A variation involving AI is known as uterine lavage or embryo flushing and transfer. In this procedure, a fertile woman is artificially inseminated with the sperm of the male partner of a woman who, for some reason, is unable to conceive, but who is still capable of carrying a pregnancy to term. Five days later, the fertilized egg is "flushed out" of the womb of the fertile woman and then placed in the womb of the infertile woman.

Issues:

AI performed using the sperm of the woman's husband or male partner raises no dilemma for most people, but AI using donor sperm raises several issues that challenge our values surrounding male parenthood. Biological paternity has been assigned a high value in most cultures, most often used to bestow "legitimacy" on children. Some clinics performing AI still require the written consent of the woman's male partner if donor sperm is used.

The simplicity of the technique has also meant that women without male partners can become pregnant through AI, either in a medical clinic or through inseminating themselves in non-medical settings using sperm from a private donor. The use of AI by single women and lesbians has perturbed some members of the medical profession to the extent that they will not perform the procedure on anyone except married heterosexual couples.

Moreover, some physicians have imposed other barriers on potential recipients of AI. They have refused to perform the procedure on people who have incomes below a certain level and on those whose intelligence is perceived to be below "normal".

This practice has alarmed many people who see these decisions as "selective breeding" practices.

It is important to recognize that there are also risks associated with uncontrolled anonymous sperm donation. For example, without limits on the number of sperm donations that can be made by one individual, it is quite possible that having donated sperm, one man could biologically "father" a number of different women's children. Ramifications such as unwitting sibling intermarriage could conceivably be the result.

Uterine lavage, on the other hand, poses definite physical risks. The embryo flushing may not be successful, leaving the woman with an unwanted pregnancy, or the procedure may force the embryo into her fallopian tubes, resulting in an ectopic pregnancy. The woman receiving the embryo also risks an ectopic pregnancy, and both women may experience long-term effects from the hormones used to synchronize their ovulation cycles.

Questions for Discussion:

Who should have access to AI procedures? How should such decisions be made? Should AI be paid for through public health funds?

Should there be a limit on the number of anonymous sperm donations that one individual can make? Or should there be controls put in place to ensure that anonymously donated sperm is used in only one successful application?

What rights and responsibilities are associated with biological parenthood? Should egg and sperm donors remain anonymous? For what reasons?

If AI can be performed successfully and safely outside of medical settings, should the practice continue to be medicalized? What controls should be placed on this practice?

SURROGATE MOTHERHOOD

Another practice that has come under recent public scrutiny is so-called "surrogate" motherhood. In fact, women in a number of different cultures have always borne children who would be raised by other people, but current commercial and social variations on this age-old practice have caused new controversy.

The modern version of a surrogacy arrangement consists of a contract between a woman and another party, usually an infertile couple, in which the woman agrees to be artificially inseminated, to carry the pregnancy to term, and then to surrender the child at birth, usually on payment of a sum of money ranging from $10,000 to $15,000. In many cases, a third party is involved in arranging the contract. In the United States particularly, commercial businesses have sprung up that specialize in locating women willing to act as surrogates and in setting up contracts.

The "surrogate" label has been attached because these women have become pregnant "in the place of" an infertile or perhaps nonexistent female partner, but of course the "surrogate" carries the actual pregnancy and bears a child as any other woman does. Moreover, the "surrogate" is almost invariably also the genetic mother of the child, since she provides the egg which is fertilized by AI. In a few cases, a woman has carried an embryo from a donated egg, meaning that she is the biological mother but is not genetically related to the baby.

It is interesting to note that if surrogacy arrangements were combined with IVF procedures that involved donated eggs and sperm, a child born as a result could have up to five "parents". The people donating the egg and sperm would be the genetic parents, the woman carrying the pregnancy would be the biological mother, and the couple who raise the child would be the social parents.

One surrogacy arrangement that captured media attention recently was the "Baby M" case in the United States, in which Mary Beth Whitehead agreed to bear a child for another couple, but changed her mind when the baby was born. The contracting couple decided to sue her and the first court decision upheld their claim as a legal contract. Ms Whitehead appealed this decision and won. The second court decision did not uphold the legality of the surrogacy contract, but awarded joint custody to Ms Whitehead and the biological father and his wife.

Issues:

The commercial aspects of surrogacy alarm many people, who see surrogacy arrangements as the selling of babies, since most known arrangements involve the payment of a fee. The counter-argument is that the fee is for reimbursement of the expenses and time involved in the conception process, the nine months of pregnancy, and the actual birth.

Even though the amount of money involved tends to be rather inadequate when measured against the nine-month effort of carrying a pregnancy and giving birth to a child, the lump-sum fee is still large enough to raise the question of who is paying for surrogacy and who is making money in this manner. In many known cases, surrogacy arrangements are most profitable for the third party or intermediary who arranges the contracts.

An unpublished report prepared for the Law Reform Commission of Canada looked at 118 such contracts involving Canadians and found that the surrogate and her family are most likely to come from a lower socioeconomic bracket than the couple contracting her to bear the child. Surrogate mothers tended to be employed in service industries or blue-collar jobs, while others were full-time housewives. Contracting couples, on the other hand, tended to be in professional occupations.[3]

Although the medical interventions involved in surrogacy tend to be minimal, if they exist at all, it is the ethical, social and legal implications of this practice that confound most people. Whether or not one sees surrogacy as baby-selling, the practice of contracting the reproductive services of a woman for the production of a baby raises many disturbing questions, for the contracting woman and her family, for the community, and for the child itself who will doubtless want information about his/her background, as so many adopted children do.

Questions for Discussion:

> **How does surrogacy affect our notions of "ownership" of children? Who has more "right" to a child, the woman who carried the pregnancy and gave birth, or the man whose sperm fertilized the woman's egg? What if the egg was also donated, particularly by the female partner of the man who provided the sperm?**

Is parenthood a genetic concept, a biological concept, or a social concept? Which factor should be seen as primary in custody decisions?

Should a woman be allowed to sell her reproductive capacities as a freely contracting individual? What limits should be placed on her activities under such a contract? Should such a contract be legally binding? Do such contracts differ from others in which people sell services or abilities in order to make a living?

What role, if any, should third parties play in such contracts?

Aside from the payment of a fee, how do surrogacy arrangements differ from current adoption practices, especially private adoption practices?

PRENATAL TESTING

Prenatal testing consists of a number of medical procedures performed to gather information about a foetus before birth. Such testing was unknown before the turn of the century, but some procedures have become quite common, even routine, at present.

i) Ultrasound

This is the most common prenatal test in current use. The basic technology was first developed by the military to detect submarines and has been used medically for almost thirty years. High frequency sound waves are directed into the uterus through a device which is pressed against the woman's abdomen. These sound waves form an image of the foetus which can be seen on a screen.

Since the first introduction of ultrasound, it has become a standard part of prenatal care in many parts of Canada. Most pregnant women living in urban areas have two ultrasound procedures, which are most often used to date the pregnancy, to detect the position of the foetus and placenta, and to detect a possible ectopic pregnancy or multiple pregnancies. The sex of the foetus can also be determined by this method.

ii) Amniocentesis

Amniocentesis, which has been available for about 15 years, is performed in the second trimester of the pregnancy. After a local anaesthetic, a hollow needle is inserted through a woman's abdomen into the amniotic sac, in order to remove a small sample of the fluid surrounding the foetus. An ultrasound is done prior to this to guide insertion of the needle.

The amniotic fluid contains cells from the foetus, which are then cultured in the laboratory. This process can yield information about chromosome disorders, biochemical disorders, developmental problems and the sex of the foetus. Test results are available after about three or four weeks.

Amniocentesis is used fairly routinely on women who are known carriers of genetic disorders or who are 35 years of age and over.

iii) Chorionic Villi Sampling

Chorionic Villi Sampling (CVS) is a more recent technique which is not yet widely available. An ultrasound-guided catheter is inserted through the pregnant woman's vagina and cervix to the placenta, from which a small amount of tissue is taken. This tissue is then analyzed for information on chromosomal or biochemical disorders. CVS can also detect foetal sex.

This procedure can be done as early as eight or nine weeks after the woman's last menstrual period and results can be available within two or three days. Anaesthetic is not required. CVS is used most commonly on women who are 35 and over or on those with a history of genetic disorders in the family.

iv) Alpha Fetoprotein Screening

A blood sample is taken from the pregnant woman and screened for the presence of alpha fetoprotein, a substance often found when the foetus has a neural tube defect such as anencephaly (severe brain deformity) or spina bifida (malformation of the spinal column).

This test is usually done between the 16th and 18th weeks of pregnancy and results are usually available within one or two weeks. Since alpha fetoprotein screening is a screening process rather than a definitive test, the results are used as an indication for further tests such as amniocentesis and ultrasound.

Issues:

Although at first glance it may seem that the only significant motivation for prenatal testing is to ensure a healthy child, recent applications of some of these procedures have alarmed many women's health advocates.

In some countries, such as China and India for example, prenatal testing is used by some to determine foetal sex. Those of the "wrong" sex, which are almost overwhelmingly female, are then aborted, since these cultures place a very high social value on male children. In India, sons are the only way for most women to ensure their socioeconomic survival. In some instances, given the high prevalence of "dowry deaths" in parts of India, the woman's life may depend on producing a son.

Even when these tests are used to ensure a healthy child, a number of problems may arise. For example, some prenatal tests are not possible until the pregnancy is well advanced, so that if, for example, a severe disability is detected, the option for an early abortion has passed. This means that, for women and couples who choose not to bear a child with a severe disability, the emotional and physical trauma is increased.

The safety of some procedures for the foetus and the woman are also under question. Amniocentesis involves a risk of miscarriage following the procedure. This risk is currently being studied in relation to chorionic villi sampling. To date, ultrasound appears not to have any short-term negative effects, but possible long-term effects are unknown.

Nor are the results of some prenatal test procedures foolproof. Even those that are very accurate cannot always predict the severity of the condition.

The discretionary use of some types of prenatal testing has also been questioned. Not every pregnant woman has access to these tests. On the other hand, almost every pregnant woman in a certain group (e.g. 35 years and older) is routinely given others. All of these practices involve assumptions that must be examined.

Questions for Discussion:

Are we trying to give birth only to those who are judged physically and mentally "perfect"? By whose standards?

What qualifies as a disability? What degree of disability should justify the termination of a pregnancy? How are these questions related to the level of services available to people with disabilities?

Is sex selection justified on any basis, including presence of a sex-linked genetic disorder?

Who should have access to prenatal testing procedures? How readily should some procedures be used, given the risks and the financial costs which may be involved?

FUTURE POSSIBILITIES

The rapid and controversial developments in new reproductive technologies are in themselves difficult to follow and understand at times. However, even more dramatic possibilities have been talked about for some time and will likely have to be dealt with in the near future.

i) Ectogenesis

If successfully developed, ectogenesis would permit the complete development of a foetus outside a woman's body, in an "artificial womb". Rapid advances in neonatal technology that allow younger and younger premature babies to be kept alive, as well as some types of embryo research, would no doubt contribute to this possibility.

ii) **Cloning**

Clones are genetically identical organisms produced from an individual organism without sexual reproduction. In mammals, clones can be produced either by inserting a nucleus from a foreign cell into an unfertilized egg or by embryo division. The latter method is already used extensively in breeding cattle.

iii) **Parthenogenesis**

Parthenogenesis involves development of an organism from an unfertilized egg. This occurs naturally in many plants and a few animals. It has been partially achieved with eggs from a mouse and has been observed in human eggs by Australian IVF researchers. Human parthenogenesis would produce only female offspring.

GENERAL QUESTIONS

There are some issues that are basic to all of the new reproductive technologies. For example, questions concerning accessibility, informed consent, commercialization of human reproduction, the role of technology, the medicalization of pregnancy and childbirth, and the role of public policy, come to mind when any of the new reproductive technologies are discussed.

For many people, the increasing medicalization of pregnancy and childbirth has meant that these events are now being approached as if they were illnesses in need of treatment, instead of natural events in a woman's life that may require medical intervention in unusual situations. Since the new reproductive technologies in general are available only through medical practitioners or institutions, these developments are often seen as continuing that trend.

What role should the medical profession play in regulating access to the new reproductive technologies? How much medical intervention is appropriate in the reproductive decisions of individuals? How much is appropriate in view of the financial costs to society?

One of the most serious questions concerns what some writers have called the "technological imperative" -- that is, knowing how to do something justifies doing it. As a society, we are increasingly dependent on various kinds of technology for our very survival. In fact, some would say that we demand that technology solve all of our human problems.

Is it worthwhile, or even possible, to halt research or practice in any of the reproductive technologies? What would justify such action?

In general, public policy and legislation have not kept pace with the rapid medical and scientific developments in this field. Much of this research continues largely unregulated or else is regulated only by the self-imposed guidelines of professionals or institutions.

What level of public or government involvement is appropriate in research and practice related to new reproductive technologies? Who should establish regulations if they are seen as desirable? Who should monitor these developments and ensure that regulations remain current in relation to rapid changes in this area?

CONCLUSION

The uses of new reproductive technologies raise many serious questions, whether the practices are in common use, are relatively recent developments, or are still in the experimental or even "science fiction" stages. These technologies are affecting the way we view children, women, men, family structures, and society itself. Many of our long-standing assumptions are being challenged or called into serious question.

Women's bodies have for many decades provided the literal experimental grounds for many new medical developments, some of which have had questionable, even disastrous effects. This is, and will continue to be, the case with new reproductive technologies. It is vital that women continue to inform themselves, to educate others, and to ask the questions that will encourage our society to think seriously about what it is we are doing.

ENDNOTES

1. Klein, Renate and Rowland, Robyn "Women as Test-Sites for Fertility Drugs: Clomiphene Citrate and Hormone Cocktails" Reproductive and Genetic Engineering Vol. 1, No. 3, 1988, pp. 251-273

2. Corea, Genoveffa The Mother Machine (New York: Harper & Row, 1985) pp. 149-150

3. "118 baby-production contracts detailed in report on surrogacy" Winnipeg Free Press, February 10, 1989